

## **8. HAZARD ASSESSMENT**

The overall objectives of this hazard assessment section are to provide guidance on the following:

- Evaluating all site preparation, grouting, excavation, and sampling project tasks to determine the extent that chemical and physical hazards may potentially impact site personnel by all routes of entry
- Establishing the necessary monitoring and sampling tasks required to evaluate exposure, determine adequate action levels to mitigate potential exposures, and provide specific actions to be followed if action levels are reached
- Determining engineering controls, isolation methods, work practices to limit personnel exposure, administrative controls, and appropriate respiratory protection and protective clothing to protect site personnel from hazards.

### **8.1 In Situ Grouting Project Drilling, Grouting, Excavation, and Sampling Activities**

Personnel will be exposed to safety and physical hazards and limited chemical agents while working at ISG project sites. Hazards exist during site preparation, grouting, excavation, and sampling activities. The magnitude of hazards to personnel entering the CWA and restricted areas is dependent on the nature of the specific tasks being conducted and relative location of the worker to the potential hazard. Engineering controls will be implemented (whenever possible), along with work practice controls, real-time monitoring, administrative controls, and site-specific hazard training to further mitigate potential exposures and hazards.

Several tables are presented to identify the potential chemical and physical hazards that may be encountered, as well as monitoring methods, action limits, and other hazard-specific mitigation measures. These include:

- Table 8-1 lists the simulated waste materials buried at the Cold Test Pit South location
- Table 8-2 lists the simulated waste materials buried at the Cold Test Pit North location
- Table 8-3 presents an evaluation of these materials with respect to potential routes of exposure, symptoms of overexposure, and the qualitative exposure risk potential based on the chemical nature of these materials and project tasks
- Table 8-4 summarizes each primary ISG project task, associated hazards, and mitigation
- Table 8-5 lists the hazards to be monitored by industrial hygiene personnel during ISG activities
- Table 8-6 lists industrial hygiene equipment available for monitoring chemical hazards
- Table 8-7 presents action levels and associated responses for specific hazards.

Table 8-1. Simulated waste packages for the Cold Test Pit South in situ grouting disposal pit (Loomis et al. 2001).

Waste Container Type	Number	Composition
Cardboard boxes (4 × 4 × 8 ft)	2	Metal debris (i.e., 1/8-in. plate steel, tubing, piping, and scrap metal), concrete and asphalt chunks (6-in. size), and pulverized wood. Metal 38%, concrete and asphalt 37%, and pulverized wood 25%
Drums (55 gal)/sacks	63	As listed below
Cardboard	25	Combustibles (i.e., cloth, paper, wood, and plastic)
Cardboard	13	Inorganic sludge (enough water to create a pastelike consistency; 390 lbm soil, 40 lbm dry Portland cement, and 36 lbm NaNO <sub>3</sub> )
Cardboard (Metal)	6	Organic sludge (38 gal of Texaco Regal Oil, 65 lbm Micro Cell-E, and 35 lbm kitty litter)
Cardboard (Metal)	5	Nitrate salts (granular: 60 wt% NaNO <sub>3</sub> , 30 wt% KNO <sub>3</sub> , 5 wt% Na <sub>2</sub> SO <sub>4</sub> , and 5 wt% NaCl)
Sacks (2 × 2 × 3 ft) (polyethylene)	14	Cloth and paper
NaNO <sub>3</sub> = sodium nitrate		
KNO <sub>3</sub> = potassium nitrate		
Na <sub>2</sub> SO <sub>4</sub> = sodium sulfate		
NaCl = sodium chloride		

Table 8-2. Simulated waste material components at the Cold Test Pit North disposal pit (DOE-ID 1999).

Simulated Waste Type	Components of Waste Type	Quantity of Components per Container	Number of Containers in Pits
Combustible debris	Dry or moist rags and paper, plastic (i.e., Teflon and PVC) and nonleaded rubber, and 50 to 100 g of $Tb_2O_3^a$	80 lb/drum	30 drums 13 boxes
Metal debris	Unleached light non-stainless steel and 250 to 300 g of $Tb_2O_3$	250 lb/drum	1 drum
Concrete and asphalt debris	Concrete, asphalt, and 50 g of $Tb_2O_3$	150 lb of concrete and 150 lb of asphalt/drum	1 drum
Graphite debris	Solid forms of graphite debris and 880 g of $Tb_2O_3$	200 lb/drum	4 drums
Inorganic sludge	30 gal of water (240 lb), 71 lb of RWMC lakebed soil 40 lb of Portland cement 18 lb of $Ca(OH)_2$ 14 lb of $CaCO_3$ 19 lb of $Na_2HPO_4$ 33 lb of $NaNO_3$ 3 lb of $CaNO_3$ 200 g of $Tb_2O_3$	438 lb/drum	26 drums
Organic sludge	30 to 38 gal (215 to 270 lb) of Texaco Regal oil (R&O 32-68) 50 to 62 lb of $CaSiO_3$ 35 lb of Oil-Dri 50 g of $Tb_2O_3$	300 to 367 lb/drum	83 drums
Nitrate salts	189 lb of $NaNO_3$ 94.5 lb of $KNO_3$ 15.75 lb of $Na_2SO_4$ 15.75 lb of NaCl	315 lb/drum	15 drums

Table 8-2. (continued).

Simulated Waste Type	Components of Waste Type	Quantity of Components per Container	Number of Containers in Pits
Wooden debris box	1,800 lb of metal 100 lb of concrete 100 lb of asphalt 300 lb of paper 50 lb of wood 400 g of Tb <sub>2</sub> O <sub>3</sub>	2,350 lb/box	1 box
Empty wooden box	N/A	N/A	1 box
Unpressurized gas cylinder	N/A	Full-size cylinder	2 cylinders
a. Terbium oxide is being added as a contamination surrogate for Plutonium.			
PVC = polyvinyl chloride	RWMC = Radioactive Waste Management Complex		
CaCO <sub>3</sub> = calcium carbonate	Ca (OH) <sup>2</sup> = calcium hydroxide	CaNO <sub>3</sub> = calcium nitrate	
CaSiO <sub>3</sub> = calcium silicate	KNO <sub>3</sub> = potassium nitrate	NaCl = sodium chloride	
Na <sub>2</sub> HPO <sub>4</sub> = sodium hypophosphate	NaNO <sub>3</sub> = sodium nitrate	Na <sub>2</sub> SO <sub>4</sub> = sodium sulfate	
Tb <sub>2</sub> O <sub>3</sub> = terbium oxide			

Table 8-3. Evaluation of simulated waste materials buried at the in situ grouting test pit locations.

In Situ Grouting Test Pit Simulated Waste or Hazardous Material (CAS #)	Exposure Limit <sup>a</sup> (PEL/TLV)	Routes of Exposure	Symptoms of Over Exposure <sup>b</sup> (Acute and Chronic)	Target Organs and Systems	Carcinogen (Source) <sup>c</sup>	Exposure Potential (regardless of personal protective equipment)
<b>Inorganic Compounds</b>						
Ca (OH) <sup>2</sup> (1305-62-0)	TLV—5 mg/m <sup>3</sup>	Skin absorption, inhalation, and contact hazard	Irritation to the eyes, skin, upper respiratory system; eye, skin burns; skin vesication; cough, bronchitis, pneumonia	Eyes, skin, respiratory system	No	<b>Low Potential</b> In drummed form with water (Cold Test Pit North).
CaNO <sub>3</sub> (10124-37-5)	None established	Inhalation, ingestion, and contact hazard	Irritation of the skin, respiratory tract; coughing, shortness of breath	None identified; primarily a localized irritant	No	<b>Low Potential</b> In drummed form with water (Cold Test Pit North).
CaSiO <sub>3</sub> (cement) (1344-95-2)	TLV - 10 mg/m <sup>3</sup> (inhalable) 5 mg/m <sup>3</sup> (respirable)	Inhalation, ingestion, and contact hazard	Irritation eyes, skin, upper respiratory system	Eyes, skin, respiratory system	No	<b>Low Potential</b> Mixed in waste container. Grouting operations should encapsulate. Highest potential during monolith excavation and sampling.
CO (630-08-0) Equipment operating inside weather structure	TLV - 25 ppm OSHA TWA – 50 ppm	Inhalation	Headache, tachypnea, nausea, lassitude (weakness, exhaustion), dizziness, confusion, hallucinations; cyanosis; depressed S-T segment of electrocardiogram, angina, syncope	Cardiovascular system, lungs, blood, CNS	No	<b>Low – Moderate Potential</b> Drill rig exhaust will be captured with active ventilation system and exhausted outside weather structure.
Clay, Micro Cell (12141-46-7)	None established	Inhalation, ingestion, and contact hazard	Irritation eyes, skin, respiratory system; cough	Eyes, respiratory system	No	<b>Low Potential</b> Mixed in waste container. Grouting operations should encapsulate.

Table 8-3. (continued).

In Situ Grouting Test Pit Simulated Waste or Hazardous Material (CAS #)	Exposure Limit <sup>a</sup> (PEL/TLV)	Routes of Exposure	Symptoms of Over Exposure <sup>b</sup> (Acute and Chronic)	Target Organs and Systems	Carcinogen (Source) <sup>c</sup>	Exposure Potential (regardless of personal protective equipment)
Diesel exhaust	TLV- 0.05 mg/m <sup>3</sup> (particulate aerodynamic diameter < 1 µm (ACGIH 2000 notice of intended changes)	Inhalation	Respiratory irritation, nose, throat or lungs, with stinging and redness of the eyes, headache, nausea, dizziness, unconsciousness	Respiratory system	ACGIH – A2	<b>Moderate Potential</b> Numerous exhaust sources at the project site.
Diesel fuel (8008-20-6) VD->1	TLV 100 mg/m <sup>3</sup> (ACGIH 2000 notice of intended changes)	Inhalation, skin absorption, and contact hazard	Eyes irritation, respiratory system changes, dermatitis	Eye, respiratory system	No	<b>Moderate Potential</b> Will be used to refuel equipment.
NO <sub>x</sub> (nitrogen oxides) (Incomplete combustion byproduct) - equipment operating in weather structure	TLV – 3 ppm (NO <sub>2</sub> ) STEL – 5 ppm OSHA C – 5 ppm (NO <sub>2</sub> )	Inhalation	Irritation eyes, nose, throat; cough, mucoid frothy sputum, decreased pulmonary function, chronic bronchitis, dyspnea (breathing difficulty); chest pain; pulmonary edema, cyanosis, tachypnea, tachycardia	Eyes, respiratory system, cardiovascular system	No	<b>Low – Moderate Potential</b> Drill rig exhaust will be captured with active ventilation system and exhausted outside weather structure.
KNO <sub>3</sub> (7757-79-1)	None established	Inhalation, ingestion, and contact hazard	Respiratory irritation, (Ig— GI pain, nausea and vomiting)	None identified; primarily a localized irritant	No	<b>Low Potential</b> Mixed in waste container. Grouting operations should encapsulate.

Table 8-3. (continued).

In Situ Grouting Test Pit Simulated Waste or Hazardous Material (CAS #)	Exposure Limit <sup>a</sup> (PEL/TLV)	Routes of Exposure	Symptoms of Over Exposure <sup>b</sup> (Acute and Chronic)	Target Organs and Systems	Carcinogen (Source) <sup>c</sup>	Exposure Potential (regardless of personal protective equipment)
Silica, crystalline – quartz (cement) (14808-60-7)	TLV - 0.05 mg/m <sup>3</sup> (respirable fraction)  OSHA PEL (Respirable) TWA 10 mg/m <sup>3</sup> /(%SiO <sub>2</sub> + 2)  Quartz (total dust): TWA 30 mg/m <sup>3</sup> / (%SiO <sub>2</sub> + 2)	Inhalation and contact hazard	Pulmonary fibrosis, silicosis	Respiratory	ACGIH - A2	<b>Low Potential</b> Mixed in waste container. Grouting operations should encapsulate. Highest potential during monolith excavation and sampling.
NaCl (7647-14-5)	None established	Inhalation, ingestion, and contact hazard	Eyes, irritation of mucous membranes	None identified; primarily a localized irritant	No	<b>Low Potential</b> Mixed in waste container. Grouting operations should encapsulate.
NaHPO <sub>4</sub> (7558-80-7) - anhydrous	None established	Inhalation, ingestion, and contact hazard	Irritation to the respiratory tract, coughing and shortness of breath, calcium phosphate deposits in the kidneys.	Eyes, skin, respiratory system	No	<b>Low Potential</b> Mixed in waste container. Grouting operations should encapsulate. Highest potential during monolith excavation and sampling.
NaNO <sub>3</sub> (7631-99-4)	None established	Inhalation, ingestion, and contact hazard	Respiratory, eyes, dermis, (Ih/Ig may cause cyanosis)	None identified; primarily a localized irritant	No	<b>Low Potential</b> Mixed in waste container. Grouting operations should encapsulate.
Na <sub>2</sub> SO <sub>4</sub> (7757-82-6)	None established	Inhalation, ingestion, and contact hazard	Respiratory, eyes, dermis	None identified; primarily a localized irritant	No	<b>Low Potential</b> Mixed in waste container. Grouting operations should encapsulate.

Table 8-3. (continued).

In Situ Grouting Test Pit Simulated Waste or Hazardous Material (CAS #)	Exposure Limit <sup>a</sup> (PEL/TLV)	Routes of Exposure	Symptoms of Over Exposure <sup>b</sup> (Acute and Chronic)	Target Organs and Systems	Carcinogen (Source) <sup>c</sup>	Exposure Potential (regardless of personal protective equipment)
Tb <sub>2</sub> O <sub>3</sub>	None established	Inhalation, contact hazard, and ingestion	Respiratory irritation, pulmonary fibrosis	Respiratory system	No	<b>Low-Moderate</b> Tracer compound distributed throughout simulated waste forms. Grouting operations should encapsulate.
Texaco Regal Oil	None established	Contact hazard	Irritation of skin and eyes	Local irritation for contact pathway	No	<b>Low Potential</b> Mixed in waste container with absorbent or other material to create sludge-like mixture. Grouting operations should encapsulate.

a. American Conference of Governmental Industrial Hygienists (ACGIH) 2001 TLV Booklet and OSHA 29 CFR 1910 substance specific standards.

b. Nervous system: dizziness, nausea, and lightheadedness. Dermis: rashes, itching, and redness. Respiratory: respiratory effects. Eyes: tearing and irritation.

c. If yes, identify agency and appropriate designation (ACGIH A1 or A2; NIOSH; OSHA; IARC; NTP).

VD = vapor density (Air = 1)  
GI = gastrointestinal

C = ceiling value  
PEL = permissible exposure limit

CNS = central nervous system  
STEL = short term exposure limit

CVS = cardiovascular system  
TLV = threshold limit value

Ca(OH)<sub>2</sub> = calcium hydroxide  
KNO<sub>3</sub> = potassium nitrate  
Na<sub>2</sub>SO<sub>4</sub> = sodium sulfate

CaNO<sub>3</sub> = calcium nitrate  
NaCl = sodium chloride  
Tb<sub>2</sub>O<sub>3</sub> = terbium oxide

CaSiO<sub>3</sub> = calcium silicate  
Na<sub>2</sub>HPO<sub>4</sub> = sodium hypophosphate

CO = carbon monoxide  
NaNO<sub>3</sub> = sodium nitrate

MSDSs for these chemicals are available at the project site.



Table 8-4. In situ grouting project tasks, associated hazards, and mitigation.

Tasks	Potential Hazards and Hazardous Agents	Hazard Elimination, Isolation, or Mitigation
<ul style="list-style-type: none"> <li>• Site preparation</li> <li>• Thrust block placement</li> <li>• Weather structure assembly and disassembly</li> <li>• Grouting equipment mobilization and demobilization</li> <li>• Grouting operation, equipment cleanout, and discharge of</li> <li>• Excavation of monolith</li> <li>• Inspection of excavated monolith</li> <li>• Destructive inspection of monolith</li> <li>• Sampling of monolith material</li> <li>• Monolith material removal and site restoration</li> </ul>	<ol style="list-style-type: none"> <li>1. <u>Simulated waste material contact or exposure and other chemicals at the task site</u>—Direct contact with simulated waste materials (if not encapsulated by grouting operation), contact with grout material (high pH), grout equipment cleanout and maintenance, or leaks, fuels, lubricants, dust, and CO and NO<sub>x</sub>.</li> <li>2. <u>Pinch points, caught-between, struck-by, and overhead hazards</u>—Equipment assembly and placement, vehicle or equipment movement, weather structure assembly and disassembly, excavation, drill string cleanout and movement, material handling.</li> <li>3. <u>Lifting and back strain</u>—Moving equipment and materials, sampling, and grout line handling and movement.</li> <li>4. <u>Tripping hazards, uneven terrain, walking, and working surfaces</u>—Cold test pit area, wet or muddy surfaces, equipment, cables, and lines on the ground, and inside weather structure.</li> <li>5. <u>Hoisting and rigging</u>—Positioning equipment at project site, thrust block placement, and weather structure assembly and disassembly.</li> <li>6. <u>Heated surfaces, heat, and cold stress</u>—Pump and drill rig motor and exhaust surfaces, outdoor work, summer and fall temperatures, and PPE usage.</li> <li>7. <u>Hazards noise levels</u>—Trucks, pumps, drill rig, heavy equipment, compressors, and hand tools.</li> <li>8. <u>Energy sources</u>—High-pressure lines and displacement pump; electrical, mechanical, thermal, and compressed air systems.</li> </ol>	<ol style="list-style-type: none"> <li>1. CWA, MSDS for all chemicals used; PPE to avoid skin contact; CO and NO<sub>x</sub> monitoring; engineering controls for grouting operation and CO exhaust; IH monitoring, water truck, and PPE (as required).</li> <li>2. Qualified operators, spotter, backup alarms, CWA, established truck, traffic lanes, body position awareness, hand, head, and body protection and tag lines for drill string and weather structure structural member movement.</li> <li>3. Mechanical lifting and movement devices, proper lifting techniques, two-person lifts (as required); store materials in racks and at waist or chest height.</li> <li>4. CWA, identify and mitigate tripping hazards and mark where possible; keep walking and working surfaces clean (where feasible); foot protection entry.</li> <li>5. CWA, qualified operators, certified rigging, follow PRD-160 requirements, tag lines, and wind restrictions.</li> <li>6. CWA and restricted areas, identify and label known heated surfaces where contact is possible; industrial hygiene monitoring; work-rest or warm-up cycles (as required); proper selection of work clothing or PPE; personnel training.</li> <li>7. CWA, industrial hygiene sound-level monitoring and dosimetry for source identification; hearing protection devices.</li> <li>8. CWA and restricted areas, posted and labeled sources; tie downs and whip checks; training; isolation of energy source (lockout/tagout) for all maintenance activities; PPE.</li> </ol>
CTP = construction test procedure    CWA = controlled work area    IH = industrial hygiene    MSDS = material safety data sheet    PPE = personal protective equipment		

Table 8-5. In situ grouting project hazards to be monitored.

Tasks	Hazards to Be Monitored <sup>a</sup>
<ul style="list-style-type: none"> <li>• Site preparation</li> <li>• Thrust block placement</li> <li>• Weather structure assembly and disassembly</li> <li>• Grouting equipment mobilization and demobilization</li> <li>• Grouting operation, equipment cleanout, and discharge of water and grout</li> <li>• Excavation of monolith</li> <li>• Inspection of excavated monolith</li> <li>• Destructive inspection of monolith</li> <li>• Sampling of monolith material</li> <li>• Monolith material removal and site restoration</li> </ul>	<p>Hazards noise - heavy equipment, trucks, drill rig</p> <p>CO and NO<sub>x</sub> – all operations inside weather structure where equipment is running</p> <p>Dust, total nuisance (respirable) – ISG test pit excavation and general ISG operations</p> <p>Crystalline silica dust (respirable) - ISG test pit excavation/destructive inspection, sampling, and monolith material removal</p> <p>Noise levels<sup>b</sup> – jet-grouting drill rig, trucks, heavy equipment, compressors, pumps, and other equipment, as deemed appropriate</p> <p>Organic compounds – fueling operations, cleaning tasks, general operations with potential for exposure to organic hydrocarbons, as deemed appropriate.</p>
a. Monitoring and sampling will be conducted (as deemed appropriate by project industrial hygiene personnel) based on specific tasks, site conditions, and professional judgment.	
b. Sound-level meter to be used for instantaneous sound levels and to determine hearing protection requirements. Additional noise dosimetry may be conducted, as deemed appropriate, based on the nature of the sound level sources and duration of exposure or project.	

Table 8-6. Equipment available for monitoring in situ grouting project hazards.

Chemical or Radiological Hazard to Be Monitored or Sampled	Equipment and Monitoring and Sampling Method <sup>a,b</sup>	
Petroleum hydrocarbons and distillates Nuisance particulates, NOC (respirable) Crystalline silica (respirable) Diesel exhaust	Personal sampling pumps with appropriate media	Petroleum distillate—NIOSH 1550 Particulates, total nuisance (respirable)—NIOSH 0600 Crystalline silica (respirable)—NIOSH 7500 Diesel exhaust—NIOSH 5040
Petroleum hydrocarbons (VOCs)	FID, PID, or equivalent	
CO, NO <sub>2</sub>	MSA-361 or equivalent, with CO and NO <sub>2</sub> cells	
Hazardous noise levels (> 85 dBA for an 8-hour workday, 83 dBA for a 10-hour day, > 140-dBA impact)	ANSI Type S2A sound level meter and ANSI S1.25-1991 dosimeter (A-weighted scale for TWA dosimetry, C-weighted for impact dominant sound environments)	
Heat and cold stress	Heat stress—WBGT, body weight, fluid intake	Cold stress—ambient air temperature, wind chill charts

a. Air sampling will be conducted as deemed appropriate by project industrial hygiene personnel based on initial direct reading instrument data, ISG operation, and professional judgment.

b. Analytical method will be selected by the IH based on site-specific conditions.

ANSI = American National Standards Institute

dBA = decibel A-weighted

NIOSH = National Institute of Occupational Safety and Health

NO<sub>2</sub> = nitrogen dioxide

TWA = time-weighted average

WBGT = wet bulb globe temperature

CO = carbon monoxide

FID = flame ionization detector

NOC = not otherwise classified

PID = photoionization detector

VOC = volatile organic compound

Table 8-7. Action levels and associated responses for in situ grouting project hazards.

Contaminant or Agent Monitored	Action Level	Response Taken if Action Level Is Exceeded
Nuisance particulates (NOC)	> 10 mg/m <sup>3</sup> (inhalable fraction) > 3 mg/m <sup>3</sup> (respirable fraction)	<ol style="list-style-type: none"> <li>1. Move personnel to upwind position of source.</li> <li>2. Use wetting or misting methods to minimize dust and particulate matter.</li> <li>3. <u>If</u> wetting or misting methods prove ineffective, <u>THEN</u> abandon area being worked OR don respiratory protection<sup>a</sup> (as directed by IH).</li> </ol>
Crystalline silica (respirable)	> 0.05 mg/m <sup>3</sup>	<ol style="list-style-type: none"> <li>1. Move personnel to upwind position of source.</li> <li>2. Use wetting or misting methods to minimize dust and particulate matter.</li> <li>3. <u>IF</u> wetting or misting methods prove ineffective, <u>THEN</u> abandon area being worked OR don respiratory protection<sup>a</sup> (as directed by IH).</li> </ol>
CO (equipment inside weather structure)	15 to 25 ppm in workers' breathing zone	Reposition and inspect exhaust-capture device system, monitor near suspected source for elevated levels, ensure personnel are on upwind side of source, open weather structure doors (as necessary) to ventilate area, and continue to monitor.
	> 25 ppm sustained for 1 minute in workers' breathing zone	<u>IF</u> > 25 ppm, identify source and leave area until level dissipates below 25 ppm, then continuous monitoring. <u>IF</u> levels cannot be kept below 25 ppm, <u>THEN</u> open all weather structure doors, cease operations (if safe to do so), and contact maintenance personnel to inspect equipment source. <sup>b</sup>
NO <sub>2</sub> (equipment inside weather structure)	1 to 3 ppm in workers' breathing zone	Reposition and inspect exhaust-capture device system, monitor near suspected source for elevated levels, ensure personnel are on upwind side of source, open weather structure doors (as necessary) to ventilate area, and continue to monitor.
	> 3 but < 5 ppm sustained for 1 minute in workers' breathing zone	<u>If</u> > 3 but < 5 ppm, identify source and leave area until level dissipates below 3 ppm, then continuous monitoring. <u>IF</u> levels cannot be kept below 3 ppm, <u>THEN</u> open all weather structure doors, cease operations (if safe to do so), and contact maintenance personnel to inspect equipment source. <sup>b</sup>

Table 8-7. (continued).

Contaminant or Agent Monitored	Action Level	Response Taken if Action Level Is Exceeded
	> 5 ppm sustained for 1 minute in workers' breathing zone	Open all weather structure doors and cease operations inside weather structure (if safe to do so) without damaging equipment. If equipment will be damaged, then move personnel unwind of source, shut down equipment when safe to do so, and contact maintenance personnel to inspect equipment source. <sup>b,c</sup>
Hazardous noise levels	< 85 dBA 8-hour TWA, < 83 dBA 10-hour TWA	No action.
	85 to 114 dBA	Hearing protection required to attenuate to below 85 dBA for an 8-hour TWA or 83 dBA for a 10-hour TWA (based device NRR).
	(a) > 115 dBA (b) > 40 dBA	(a) Isolate source, evaluate NRR for single device. Double protection, as needed. (b) Control entry, isolate source. Only approved double protection worn.
a. Respiratory protection will be prescribed by the project IH (see Section 9).		
b. All drilling and grouting equipment must be secured and left in a safe configuration before leaving area. If personnel must stay in weather structure at levels above action limit to secure equipment, then open all doors to dilute airborne concentrations and continue to monitor. Every effort will be taken to eliminate source of CO or NO <sub>2</sub> before abandoning equipment with grout in lines.		
c. At no time will personnel continue to work in areas with sustained concentrations of NO <sub>2</sub> above 5 ppm (OSHA ceiling value).		
NOC = not otherwise classified	CO = carbon monoxide	dBA = decibel A-weighted
NRR = Noise reduction rating	ppm = parts per million	TWA = time-weighted average
		mg/mg <sup>3</sup> = milligrams per cubic meter
		NO <sub>2</sub> = nitrogen dioxide

As stated earlier, the ISG test pits were constructed for the evaluation of this treatability study to simulate statistically average conditions for the SDA and closely represent similar soil types, mineralogy, permeability, and waste deposition. Only the contaminants placed in the test pit are expected to be encountered, and the hazards from these materials are minimal based on the fact that they are currently buried. Grouting will provide a stable matrix for destructive examination. If contaminants other than those listed on Table 8-2 through 8-3 are encountered, the HSO will evaluate the hazards and determine the best course of action to be taken to protect the workers and the environment. Engineering and administrative controls, worker personal protective clothing use, personnel monitoring, and restricted access to potential contaminated areas form the mitigation strategy to eliminate personnel exposure.

Safe work permits may be used in conjunction with this HASP to address hazardous conditions at the site. These permits will augment this HASP and further detail specialized protective equipment.

## **8.2 Routes of Exposure**

Exposure pathways for potential contaminants that may be encountered during ISG activities are directly related to the nature of the individual project tasks (e.g., grouting, sampling, and destructive examination). Engineering controls, industrial hygiene monitoring, training, and work controls are all intended to mitigate potential exposures and uptake of contaminants, however, the potential for exposure to contaminants that may be encountered still exists.

Exposure pathways include the following:

- Inhalation of contaminated compound vapors or fugitive dusts during grouting, excavation, or sampling tasks. Inhalable dusts may have trace amounts of pit simulated waste constituents resulting in potential respiratory tract deposition.
- Skin absorption and contact with grout-covered surfaces during grouting. Sampling or fuel contact (during refueling tasks) can be absorbed through unprotected skin, or is corrosive (US grout and Tank grout may have pH as high as 10), resulting in skin irritation or potential absorption through the skin or skin contamination.
- Ingestion of contaminated materials adsorbed to dust particles or on surfaces, resulting in potential uptake of contaminants through the gastrointestinal tract that may result in GI irritation or deposition to target organs.
- Injection by breaking of the skin while handling equipment or materials, or migration through an existing wound resulting in localized irritation, contamination, uptake of soluble contaminants, and deposition of insoluble contaminants.

## **8.3 Environmental and Personnel Monitoring**

The potential for exposure to chemical hazards exists if contaminants are available in an airborne fraction, or from internal combustion engine byproducts inside the weather structure. Engineering and administrative controls, worker training, and the use of protective equipment will mitigate most of these hazards. Monitoring with direct reading instruments will be conducted to provide IH personnel with real-time data to assess the effectiveness of these controls. In addition, controlled work and restricted areas will be established (see Section 7).

### **8.3.1 Industrial Hygiene Monitoring**

Various direct reading instruments and full-period sampling equipment may be utilized to determine the presence of chemical and other physical agents. The frequency and type of sampling and monitoring will be determined by changing site conditions, direct reading instrument results, observation, and professional judgment.

All full- and partial-period airborne contaminant sampling may be conducted, as deemed appropriate by the project IH, based on direct reading instrument readings and changing site conditions. If conducted, all air sampling will be done using applicable NIOSH or OSHA methods and in conformance to the INEEL Safety and Health Manuals. Risk assessments for site personnel will be conducted according to MCP-153, "Industrial Hygiene Exposure Assessment."

### **8.3.2 Industrial Hygiene Instrument and Equipment Calibration**

All monitoring instruments will be maintained and calibrated in accordance with the manufacturer's recommendations, existing industrial hygiene protocol, and in conformance to the INEEL Safety and Health Manuals. Direct reading instruments will be calibrated, at a minimum, prior to daily use, and more frequently as determined by the project IH.

### **8.3.3 Exposure Action Limits**

Action levels have been established to prevent and mitigate potential personnel exposure to chemical and physical hazards at the cold test pits during ISG activities. The project HSO, in conjunction with the IH and safety professional, will evaluate activities each day to identify changes in site-specific conditions. If action levels are reached, personnel will take the appropriate actions, as listed in Table 8-7.

It is important to understand that the ISG equipment must be left in a safe configuration before leaving the area, when an action level has been exceeded, and to prevent equipment damage or creating additional hazards. The instantaneous generation of airborne concentrations of carbon monoxide (CO) or nitrogen dioxide (NO<sub>2</sub>) is not expected unless engineering controls fail. Monitoring levels should gradually increase as a result of engineering performance decline or ineffective use (e.g., exhaust hose out of position over source). Elevated CO levels above the action limits do not represent an immediate hazard to personnel and mitigative actions (e.g., opening all weather structure doors) should be taken to dilute concentrations. Every effort will be made to eliminate the source of CO before taking action that could potentially damage equipment from leaving grout in the system. The NO<sub>2</sub> levels above 3 ppm warrant the immediate actions listed in Table 8-7.

## **8.4 Physical Hazards Evaluation, Control, and Monitoring**

The physical hazards present at this project site and the methods that will be used to monitor and control them are described in this section. It is critical that all personnel are aware and understand the nature of the tasks to be conducted, the equipment to be used, and the controls that are in place to eliminate or mitigate potential safety hazards.

### **8.4.1 Temperature Extremes**

Project activities will be conducted during months where there is a potential that both heat- and cold-stress factors could affect task-site personnel based on ambient air temperatures and layered PPE.

**8.4.1.1 Heat Stress.** Variable outside temperatures are expected during grouting and sampling tasks, and personnel may be required to wear protective clothing that prevents the body from cooling. High ambient air temperatures can result in increased body temperature, heat fatigue, heat exhaustion, or heat stroke that can lead to symptoms ranging from physical discomfort, unconsciousness, to death. Personnel must inform the FTL or HSO when experiencing any signs or symptoms of heat stress, or observing a fellow employee (i.e., “buddy”) experiencing them. Heat stress hazards are further described in Table 8-8 and in MCP-2704, “Heat and Cold Stress.”

Monitoring for heat stress conditions will be performed according to MCP-2704, “Heat and Cold Stress.” Depending on the ambient weather conditions, work conditions, type of PPE worn, and the physical response of work operations personnel, the IH will inform the FTL and HSO of necessary adjustments to the work and rest cycle. Additionally, physiological monitoring may be conducted to determine if personnel are replenishing liquids fast enough. A supply of cool drinking water will be provided in designated eating areas and consumed only in these areas. Workers may periodically be interviewed by the IH or HSO to ensure that the controls are effective and that excessive heat exposure is not occurring. Workers will be encouraged to monitor their body signs and to take breaks if symptoms of heat stress occur.

Individuals showing any of the symptoms of heat exhaustion listed in Table 8-8 will (1) stop work, (2) exit work area, (3) be decontaminated (as appropriate), (4) remove protective clothing (as applicable), (5) move to sheltered area to rest, (6) be provided cool drinking water, and (7) be monitored by a medic or cardiopulmonary resuscitation (CPR)/first-aid certified employee.

**8.4.1.2 Low Temperatures.** Exposure to low temperatures could be a factor during ISG activities if the conditions are right. Relatively cool ambient temperatures and wet or windy conditions increase the potential for cold injury to personnel. The project IH and HSO will be responsible for obtaining meteorological information to determine if additional cold stress administrative controls are required. The hazards and monitoring of cold stress are discussed in MCP-2704. Additional cold weather hazards from working on snow- or ice-covered surfaces may exist if ISG activities carryover into fall or winter months. Slip, fall, and material handling hazards are increased under these conditions. Every effort must be made to ensure walking surfaces are kept clear of ice. The FTL or HSO should be notified immediately if slip or fall hazards are noted at the grouting and sampling sites.



Table 8-8. Heat stress signs and symptoms.

Heat-Related Illness	Signs and Symptoms	Emergency Care
Heat rash	Red skin rash and reduced sweating	Keep the skin clean, change all clothing daily, and cover affected areas with powder containing cornstarch or with plain cornstarch.
Heat cramps	Severe muscle cramps, exhaustion, sometimes with dizziness or periods of faintness	Move the patient to a nearby cool place and give the patient half-strength electrolytic fluids. If cramps persist, or if more serious signs develop, seek medical attention.
Heat exhaustion	Rapid, shallow breathing; weak pulse; <u>cold, clammy skin</u> ; <u>heavy perspiration</u> ; total body weakness; dizziness that sometimes leads to unconsciousness	Move the patient to a nearby cool place. Keep the patient at rest, give the patient half-strength electrolytic fluids, treat for shock, and seek medical attention.  DO NOT TRY TO ADMINISTER FLUIDS TO AN UNCONSCIOUS PATIENT.
Heat stroke	Deep, then shallow breathing; rapid, strong pulse, then rapid, weak pulse; <u>dry, hot skin</u> ; dilated pupils; loss of consciousness (possible coma); seizures or muscular twitching	Cool the patient rapidly. Treat for shock. If cold packs or ice bags are available, wrap them and place one bag or pack under each armpit, behind each knee, one in the groin, one on each wrist and ankle, and one on each side of the neck. Seek medical attention as rapidly as possible. Monitor the patient's vital signs constantly.  DO NOT ADMINISTER FLUIDS OF ANY KIND.

**Note:** Heat exhaustion and heat stroke are extremely serious conditions that can result in death and should be treated as such. Transport individual immediately to the nearest medical facility.

#### 8.4.2 Noise

Personnel working at the task site may be exposed to noise levels that exceed 85 decibel A-weighted (dBA) for an 8-hour time-weighted average (TWA) and 83 dBA for a 10-hour TWA during ISG operations from various pieces of equipment in use. The effects of high sound levels (i.e., noise) may include the following:

- Personnel being startled, distracted, or fatigued
- Physical damage to the ear, pain, and temporary or permanent hearing loss
- Interference with communication that would warn of danger.

Noise measurements (using instruments listed in Table 8-6) will be performed by the IH according to MCP-2719, "Controlling and Monitoring Exposure to Noise," to determine if personnel are above allowable noise exposure levels. A threshold-limit value (TLV) of 85 dBA TWA will be applied to personnel exposed to noise levels over no more than an 8-hour day. This level is based on a 16-hour recovery period in a low-noise environment. If personnel are required to work longer than 8 hours in a hazardous noise environment, then the TLV will be adjusted to a lower value. The project IH must be

consulted regarding modifications to the 85 dBA for an 8-hour TLV and 83 dBA for a 10-hour TWA value.

Personnel whose noise exposure routinely meets or exceeds the allowable level will be enrolled in the INEEL OMP or appropriate subcontractor hearing conservation program. Personnel working on jobs that have noise exposures greater than 85 dBA (83 dBA for a 10-hour TWA) will be required to wear hearing protection until noise levels have been evaluated, and will continue to wear the hearing protection, as specified by the IH, until directed otherwise.

### **8.4.3 Fire and Flammable Materials Hazards**

Flammable and combustible liquids and material may be used at the ISG cold test pit task sites for refueling equipment and will be transferred and stored in the SZ. Portable fire extinguishers, with a minimum rating of 10A/60BC will be strategically located at the site to combat Class A, B, and C fires. They will be located in the CWA on or near site equipment that has exhaust heat sources, and all equipment capable of generating ignition (or that has the potential to spark). A sufficient number of field team members will receive fire watch training, as listed in Table 4-1.

**8.4.3.1 Project Equipment Fire Hazards.** Combustible or ignitable materials in contact with or near exhaust manifolds, catalytic converters, or other ignition sources could result in a fire. The INEEL fire department may have to authorize any hot work to be done if the fire danger at the INEEL is deemed high or extreme. Contact the safety professional for the project before initiating a hot work permit. The project fire protection engineer will identify these fire sources as equipment is brought on the site. The accumulation of combustible materials will be strictly controlled at the ISG cold test pit sites. Disposal of combustible materials will be assessed at the end of each shift. Class A combustibles, such as trash, cardboard, rags, wood, and plastic, will be properly disposed of in metal receptacles in the SZ and in appropriate waste containers within the CWA.

Diesel fuel used at the task site for fueling the equipment will be safely stored, handled, and used. Only FM/UL-approved flammable liquid containers, labeled with the content, will be used to store fuel. All fuel containers will be stored at least 15 m (50 ft) from any facilities (e.g., trailers) and ignition sources, or stored inside an approved flammable storage cabinet. Additional requirements are provided in MCP-584, "Flammable and Combustible Liquid Storage and Handling." Portable motorized equipment (e.g., generators and light plants) will be shut off and allowed to cool down, in accordance with the manufacturer's operating instructions, prior to refueling to minimize the potential for a fuel fire. Refueling tasks will only be conducted by qualified fuel handling personnel.

### **8.4.4 Biological Hazards**

The ISG cold test pit sites are located in areas that provide habitat for various rodents, insects, and reptiles. Based on biological studies done at the INEEL, indigenous deer mice have been known to carry the Hantavirus. The Hantavirus may be present in the nesting and fecal matter of deer mice. A potential exists for project personnel to disturb nesting or fecal matter during the course of mobilization and intrusive activities, and from material handling tasks in the weather structure. If such materials are disturbed, they can become airborne and create a potential inhalation pathway for the virus. Also, contact and improper removal of these materials may provide additional inhalation exposure risks.

If suspect rodent nesting or excrement material is encountered, the project IH will be notified immediately and no attempt will be made to remove or clean the area. Following an evaluation of the area, the IH will provide the necessary guidance for protective equipment, mixing, and application of the

disinfecting bleach solution, and proper disposal method of the waste (see MCP-2750, “Preventing Hantavirus Infection”).

Snakes, spiders, ticks, mosquitoes, and insects may also be encountered at the cold test pit sites. Common areas to avoid include material stacking and staging areas, under existing structures (e.g., trailers and buildings), under boxes, and other areas that provide shelter for snakes and spiders. Protective clothing will prevent insects from direct contact with personnel, however, repellent may be required during Level D activities. Areas where standing water has accumulated provide breeding grounds for mosquitoes and should be avoided. In cases where large areas of standing water is encountered, it may be necessary to pump it dry or add a small concentration of nonhazardous surfactant to the water to break the surface tension (i.e., mosquito hatching phases). Consult with the FTL and project environmental coordinator before adding surfactant to standing water areas.

#### **8.4.5 Confined Spaces**

No confined spaces have been identified or are anticipated to be encountered at the ISG cold test pit sites. If a suspected confined space is discovered and not properly posted, it will be treated as a permit-required confined space until a determination is made by an assigned safety or IH professional.

#### **8.4.6 Safety Hazards**

Industrial safety hazards encountered while performing tasks at the ISG cold test pit sites pose a significant and the most likely threat to personnel. Section 6 provides general safe-work practices that must be followed at all times. The following sections describe specific industrial safety hazards and procedures to be followed to eliminate or minimize potential hazards to project personnel.

**8.4.6.1 Handling Heavy Objects.** Installing the ISG equipment and components including, but not limited to, the weather structure members, grouting equipment, drill string sections, high-volume air samplers, and various other pieces of equipment may result in a back injury or strain. Manual material handling will be minimized through task design and use of mechanical or hydraulic lifts whenever possible. All tasks involving manual lifting will be evaluated by the project IH, in accordance with MCP-2692, “Preventing Ergonomic and Back Disorders.”

**8.4.6.2 Powered Equipment and Tools.** All power equipment and tools will be properly maintained and used by qualified individuals according to the manufacturer’s specifications. Program requirements document (PRD)-5101, “Portable Equipment and Handheld Power Tools,” will be followed for all work performed with powered equipment. All power tools and equipment used outdoors will be ground fault circuit interrupter protected.

**8.4.6.3 Heavy Equipment and Moving Machinery.** The hazards associated with the operation of heavy equipment include injury to personnel, equipment damage, or property damage. All heavy equipment will be operated in the manner in which it was intended and according to manufacturer’s instructions. Only authorized personnel will be allowed in the vicinity of operational heavy equipment and should maintain visual communication with the operator. All equipment operators will be qualified to operate the equipment being used. Work-site personnel will comply with MCP-2745, “Heavy Industrial Vehicles,” and MCP-2743, “Motor Vehicle Safety.” Additional safe practices include:

- Only qualified operators will operate heavy equipment.
- All heavy equipment will have backup alarms.

- Walking directly in back of or to the side of heavy equipment without the operator's knowledge is prohibited. All precautions will have been taken prior to moving heavy equipment.
- While operating heavy equipment in the work area, the equipment operator will maintain communication with a designated person responsible for providing direct voice contact or approved standard hand signals. In addition, all site personnel in the immediate work area will be made aware of the equipment operations.
- All equipment will be kept out of established truck traffic lanes and access ways and will be stored so as not to endanger personnel at any time.

**8.4.6.4 Hoisting and Rigging.** A crane or boom truck and associated rigging will be required to position equipment, weather structure members, and thrust block sections at the ISG Cold Test Pit South site. All hoisting and rigging operations will be accomplished in accordance with the DOE-STD-1090-99, "Hoisting and Rigging," and PRD-160, "Hoisting and Rigging." A lifting sketch or similar rigging plan will be developed for hoisting the ISG thrust blocks or attached manufacturer's engineering lift points. This sketch (or rigging plan) will contain a sketch of the thrust blocks, including the lifting points, center of gravity, gross weight, and required rigging. All rigging used at the ISG site will have a current load certification tag (or equivalent) demonstrating operability. All equipment operators will be qualified to operate the specific equipment used. Additionally, for mobile cranes or boom trucks, the operator or designated person will visually inspect items following each day, or prior to use, if the crane has not been in regular service. These items include, but are not limited to:

- All control mechanisms for maladjustment interfering with proper operation
- Crane hooks and latches for deformation, cracks, and wear
- Hydraulic systems for proper oil level
- Lines, tanks, valves, pumps, and other parts of air or hydraulic systems for leakage
- Hoist ropes for kinking, crushing, birdcaging, and corrosion
- All anti-two-block, two-block warning, and two-block damage prevention systems for proper operation.

**Note:** The operator or other designated person will examine deficiencies and determine whether they constitute a safety hazard. If deficiencies are found, they will be reported to the safety professional and hoisting rigging operations will not proceed until deficiencies are corrected.

**8.4.6.5 Electrical Hazards and Energized Systems.** Electrical equipment and tools, as well as overhead lines, may pose shock or electrocution hazards to personnel. Safety-related work practices will be employed to prevent electric shock or other injuries resulting from direct or indirect electrical contact. If work on energized systems is necessary, these practices will conform to the facility supplemental requirements in MCP-2731, "Electrical Safety," MCP-3650, "Chapter IX Level I Lockouts and Tagouts," or MCP-3651, "Chapter IX Level II Lockouts and Tagouts," and Parts I through III of NFPA 70E. In addition, all electrical work will be reviewed and completed under the appropriate work controls (i.e., SWPs and work orders). Additionally, any generators used at the project sites will be properly wired and grounded, in accordance with MCP-2731, "Electrical Safety," and 29 CFR 1926, Subpart K, "Electrical Safety."

**8.4.6.6 Personal Protective Equipment.** Wearing PPE will reduce a worker's ability to move freely, see clearly, and hear directions and noise that might indicate a hazard. Also, PPE can increase the risk of heat stress. Work activities at the task site will be modified, as necessary, to ensure that personnel are able to work safely in the required PPE. Work-site personnel will comply with MCP-2716, "Personal Protective Equipment." Project PPE levels for each ISG task are described in Section 9 and listed in Table 9-1.

**8.4.6.7 Decontamination.** Decontamination is not anticipated to be required during the course of the ISG project for other than normal grout cleanout operations. Section 10 describes contingencies (if materials are encountered) that would require additional personnel or equipment decontamination. The appropriate MCPs provide additional requirements for decontamination requirements.

When required, decontamination procedures (see Section 10) and applicable MCPs must be followed and the appropriate level of PPE worn during decontamination activities. Project IH personnel will follow the appropriate MCP and general industrial hygiene practices. Equipment decontamination will be conducted as described in Section 10.

**8.4.6.8 Walking and Working Surfaces.** Because of slip, trip, and fall hazards associated with work conducted during winter months, the OU 7-13/14 ISG tasks will be performed in late fall. Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, slips, and falls. The Cold Test Pit South and North sites present tripping hazards because of uneven terrain and existing surface rock penetrations. Additionally, the potential for slip, trip, and fall hazards will be increased during winter months because of ice- and snow-covered surfaces combined with objects beneath the snow. All personnel will be made aware of existing tripping hazards during the pre-job briefing.

**8.4.6.9 Excavation, Surface Penetrations, and Outages.** Excavation tasks will be required at the Cold Test Pit project sites for monolith destructive examination, inspection, and sampling tasks. There are no underground utilities in the ISG buried waste pit area of the Cold Test Pit. A competent person will be designated for all excavation tasks. Additionally, a qualified person will be identified to address structural issues related to monolith stability during final excavation and destructive tasks (i.e., breaking the monolith to collect samples and examination). Definitions are provided below.

- In accordance with 29 CFR 1926.32(f), a **competent person** for excavation activities means "one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them."
- In accordance with 29 CFR 1926.32(i), a **qualified person** means "one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project."

The final elevation depth to the bottom of the monolith is expected to be approximately 10 to 12 ft (3 to 3.7 m) below existing grade. The grade is based on covering of the waste placed in the constructed pits. All excavation activities will be conducted and monitored in accordance with PRD-22, "Excavation and Surface Penetration," and 29 CFR 1926, Subpart P, "Excavations." The following are some key elements from these requirements:

- As required, structural ramps used solely by employees as a means of access or egress from excavations will be designed by a competent person. Structural ramps used for access or egress of equipment will be designed by a competent person qualified in structural design, and will be constructed in accordance with the design.

- Daily inspections of excavations, the adjacent areas, and protective systems will be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection will be conducted by the competent person prior to the start of work, and as needed throughout the shift. Inspections will also be made after every rainstorm or other hazard-increasing occurrence.
- Sloping or benching will be constructed and maintained in accordance with the requirements set forth in 29 CFR 1926, Subpart P, Appendix B, for the soil type, as classified by the competent person. This classification of the soil deposits will be based on the results of at least one visual and at least one manual analysis. Soil classification for Cold Test Pit South and Cold Test Pit North soils will be assumed to be Type-C soil for all sloping requirements.
- If the monolith excavation is not sloped on all sides, then unprotected sides or edges 6 ft (1.8 m) or more above a lower level will be protected from falling by the use of guardrail systems, safety net systems, personal fall-arrest systems, or restricted area or access locations (controlled access zones) established to prevent personnel access to the unprotected sides or edges. The excavation will be evaluated by a qualified person with recommendations provided.

In addition, the competent person will evaluate excavation at each excavation interval (i.e., top overburden removal and complete excavation) to determine proper slope and access requirements based on the competence (i.e., structural integrity) of the monolith, and requested access requirements by project personnel to conduct visual inspections and sampling. All debris hazards extruding from the monolith (e.g., drum lids, wood debris, metal pipe, tubing, or plates) will be identified and marked or padded in a manner that eliminates potential personnel injury prior to allowing personnel in close proximity to the monolith. At no time will personnel be allowed to conduct activities (e.g., destructive inspections) that would compromise the integrity of the monolith when in close proximity to it.

A restricted area around the monolith will be established during all destructive inspections involving heavy equipment to break off faces of the monolith. Following these activities, walking and working surfaces and entry into the area will be evaluated by the HSO and safety professional to determine the best access to the debris and monolith area. Access to this area will be limited to authorized personnel only.

#### **8.4.7 Inclement Weather Conditions**

The ISG operations will be conducted inside the weather structure at the Cold Test Pit South and outside at the Cold Test Pit North. Inclement or adverse weather conditions (e.g., sustained strong winds 25 mph or greater, electrical storms, and heavy precipitation) may develop that pose a threat to persons or property at the ISG task site. These conditions will be evaluated and a decision made by the HSO, with input from the IH, safety professional, and other personnel (as appropriate), to stop work, employ compensatory measures, or proceed. The FTL will comply with MCPs and site work control documents that specify limits for conducting activities in inclement weather. During all site activities, the HSO, in consultation with the safety professional, will determine if wind or other weather conditions pose unacceptable hazards to personnel or the environment.

**Note:** Wind restrictions governing hoisting and rigging activities are provided in PRD-160, “Hoisting and Rigging.”

## **8.5 Other Site Hazards and Inspections**

Task-site personnel should continually look for potential hazards and immediately inform the FTL or HSO of them so that action can be taken to correct the condition. The HSO and FTL will visually inspect the site to ensure that barriers and signs are being maintained, unsafe conditions are corrected, and debris is not accumulating on the site. These inspections will be conducted in addition to the regulatory-mandated daily excavation inspection.

Periodic safety inspections will be performed by the FTL (or designee) using an appropriate checklist, in accordance with MCP-3449, "Safety and Health Inspections." Additionally, targeted or required self-assessments may be performed during ISG operations, in accordance with MCP-8, "Self-Assessments Process for Continuous Improvement." All inspections and assessments will be noted in the FTL logbook. Health and safety professionals present at the task site may, at any time, recommend changes in work habits to the FTL. However, all changes that may affect the project's written work control documents (i.e., HASP, JSAs, and SWPs) must have concurrence from the appropriate project technical discipline representative onsite and have a DAR prepared, as required.